

Rockwell (A. D.)

ON THE

DIFFERENTIAL INDICATIONS

FOR THE

USE OF THE FARADIC AND GALVANIC CURRENTS.

BY

A. D. ROCKWELL, M. D.,

NEW YORK.



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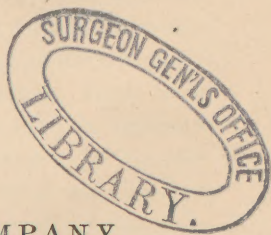
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ON THE DIFFERENTIAL INDICATIONS FOR THE USE OF THE FARADIC AND GAL- VANIC CURRENTS.¹

THE differential indications for the use of the faradic and galvanic currents is one of the most interesting and important themes for consideration in the department of medical electricity; and I undertake its discussion the more readily, since the accumulated investigations and experiences of the past decade have wrested many things that are important from the domain of speculation, and clearly established their bearings and relations. The *relative* value of the two currents resolves itself mainly into a question of experience. Both are valuable aids in the treatment of various diseases, both are frequently serviceable in the treatment of the same disease, while in certain conditions the faradic current is alone indicated, and in others the galvanic. One, with a certain line of experience, finds that his best results have been through the use of faradism; while another, with a different class of cases, finds that galvanism is best adapted to his use.

This idea finds its illustration in a number of articles that have appeared during the past year or so, regarding the rela-

¹ Read before the New York Medical Journal Association, November, 1876.

tion of electricity to pain. The well-known power of the galvanic current to relieve many forms of pain is repeatedly emphasized, while the efficacy of the faradic current in the same direction is seldom referred to; hence the inference very naturally is that the latter, for this purpose, is of but little value.

The truth is, that faradism is not only invaluable in many forms of pain, as will be indicated further on, but in certain conditions relieves, where galvanism is not only useless, but worse than useless, since it serves only to exaggerate the existing distress. The simple question of the value of one current, as compared to the other, is therefore worthy of but little consideration; being simply two manifestations of one force, they have each their functions, both as independent and supplemental agents.

The differential indications for the use of faradism and galvanism may, on the contrary, well demand the closest scrutiny, for on the accuracy with which we estimate these indications will largely depend the success of our efforts. If we do not clearly appreciate the difference in action, and adaptation to symptoms, of the currents, we either fail to obtain results that are obtainable, or valuable time is lost in the change of treatment.

An intelligent and satisfactory estimate of this point demands both a knowledge of the physical and physiological distinctions of the currents, and an experience that has not only been sufficiently extensive and varied, but that has been carefully and systematically formulated. In regard to the first (the physical and physiological distinctions of the currents) it has been so repeatedly treated of from time to time in medical journals, and is so thoroughly discussed in special treatises which are readily obtainable, that I shall not enter upon their consideration in detail, but shall rather attempt some practical observations drawn from personal experience.

The known physical and physiological distinctions of the two currents do indeed afford sufficient data to enable us at times to differentiate with accuracy in the selection of the currents, and the application of certain methods.

For example: the faradic current, by virtue probably of

its greater mechanical effects, is powerfully tonic in its action, and by the method of general faradization is indicated in many cases of nervous exhaustion, and by localized faradization in the mal-nutrition and atrophy of muscles.

The galvanic current, by virtue of its greater power of overcoming resistance, is indicated when we wish to act upon the central nervous system, and, through its superiority in exciting nerve-irritability, we use it to produce contractions in paralyzed muscles that fail to respond to the faradic. So far forth, then, our knowledge of electro-physics and physiology can prove directly serviceable in the adaptation of the proper treatment, but none the less must we to a very considerable extent rely upon the aid afforded by repeated clinical observation. In a practical review of the subject at hand, it seems natural to consider—1. Those diseases, or symptoms of disease, which seem to demand the faradic current; 2. Those that call for the galvanic; and, 3. Those in which both are frequently and interchangeably indicated.

1. Concerning those diseases that seem to demand the faradic current alone, there is but little to be said. There are in various generic diseases, if I may so speak, specific symptoms that invariably demand one or the other of the two currents, and even special qualities of current—and to this point allusion will presently be made; but there are few distinct organic or functional conditions that in every phase of their manifestation demand alone and always any special form of electricity.

Asthenopia, a symptom depending on an absolute or relative deficiency of energy in the muscles of accommodation or of the internal recti, and accompanied by hyperæsthesia of the retina and of the ciliary nerves, is about the only distinct disease that seems to demand the faradic current alone. I will not say that galvanism is never serviceable; but my experience, at least, seems to teach that the instances where faradism is not immeasurably superior to galvanism are so exceptional as practically to exclude the latter from consideration.

2. In regard to the exclusive use of galvanism, there is also but little to be said, although it certainly has a somewhat

wider range. I would designate spinal irritation, certain sequelæ of cerebro-spinal meningitis, and most of those skin-affections in which electricity has been shown to be of service, as the distinct diseases in which the galvanic is uniformly superior to the faradic.

3. Those diseases in which either current may prove equally efficacious, or where at one stage of the symptoms the galvanic, and later, the faradic current is indicated.

Paralysis may be said to be the disease for which electricity is *par excellence* the remedy, and yet, as is well known, it is frequently of very little use where the symptoms arise from certain organic conditions, but may be absolutely contra-indicated. In hemiplegia, where there exists, as is so often the case, an exalted electro-muscular contractility, electricity, if used at all, should be used in the form of faradization, and with an exceedingly mild and rapidly interrupted current.

Under this treatment, improvement in the symptoms is not unfrequently accelerated, the paralyzed member becoming stronger, and the muscular contractions less readily produced; and, even when muscular contractions are *somewhat less* readily called out than in the normal condition, the same current is as a rule preferable.

But when, on the contrary, there is a very great diminution, and even, relatively to the faradic current, a complete loss of electro-muscular contractility, the galvanic current is always indicated, the faradic coming into play only when the muscles give evidence of considerable reaction to its influence. In paraplegia, whether depending upon an absolute structural change in the cord, or upon causes that result in simple anæmia or hyperæmia, we generally find, after a short time, complete or approximate loss of farado-muscular contractility. The galvanic current is alone applicable in these cases, for the specific purpose of restoring nerve-excitability, although the faradic is useful in attempts to improve the impaired nutrition of the paralyzed members.

The difference in the reaction of the two currents is typically illustrated in facial paralysis, and especially when it results from the action of cold (*rheumatismal*) or compression.

In these cases the faradic current does not cause con-

tractions, while not only do the muscles respond to the galvanic, but a much weaker current will answer than when the parts are normal.

As the patient improves, it takes an increased tension of galvanism to cause the same effects, until finally farado-muscular contractility becomes manifest. This phenomenon has been observed also in traumatic paralysis of the peroneal nerve, and in a case of rheumatismal paralysis of the circumflex nerve. The above as a clinical fact is thoroughly substantiated, but it is interesting to note how it is reënforced by electro-physiological experiment.

Erb, and after him Ziemssen and Weiss, found that, after the laceration or division of the sciatic nerve in a rabbit, the excitability of the muscles through the first week became diminished for both currents; but subsequently, while farado-muscular contractility became more and more feeble, galvanomuscular contractility rapidly increased, until two cells caused contractions. The following is in brief the explanation offered by Onimus for these differences in the action of the two currents:

The *duration* of a current is *the* important factor in the production of muscular contractions. The closing of an induced or faradic current is only 0.0114" in duration, while that of the galvanic is $\frac{1}{20}$ of a second, hence the faradic more readily excites the healthy nerves and muscles; but, when these are diseased, a longer action is necessary, hence the galvanic is most potent. It is claimed that the faradic current does not *directly* cause contraction of a muscle, but *indirectly* through the intra-muscular nerves; the galvanic current, on the other hand, has a feeble action on intra-muscular nerves, but exerts a powerful action on idio-muscular contraction. The probability that, in facial paralysis of rheumatismal origin (the cold acting on the periphery), the intra-muscular nerves are attacked from the beginning, accounts for the rapid loss of farado-muscular contractility, while the absence of profound alteration of the muscular fibres, over which the galvanic current has such a ready action, accounts for the retention of galvanomuscular contractility.

In the essential paralysis of childhood, the farado-muscular

contractility is generally diminished, and often abolished, while occasionally the galvanic current, as in facial paralysis from cold, produces contractions more readily than in health. If the muscles respond in any marked degree to faradization, it should be used; if not, galvanism is indicated.

The relief of pain, whether of a pseudo-neuralgic or hysterical character, or whether dependent on true neuralgia or other causes, is a very important function of electrization; but in no condition has it been more difficult to discriminate correctly in the selection of the proper method of electrical treatment. True neuralgia, as defined by Anstie, is without doubt most successfully treated by galvanism, while hysterical neuralgia, and the so-called pseudo-neuralgia, which are simply forms of pain, occupying certain areas, and running seemingly in the direction of certain nerves, yield most readily to faradism.

More specifically, the effects of *pressure* in the various forms of neuralgia are exceedingly useful, as guiding symptoms, indicating the proper current. I do not by any means lay it down as a universal law, but it will certainly be found that, in the great majority of cases of neuralgia, where firm pressure over the affected nerves aggravates the pain, the galvanic current is indicated, while the faradic current has the greater power to relieve when such pressure does not cause an increase of pain.

In the class of cases called sometimes hysterical hyperæsthesia, it is well known that firm and prolonged pressure affords marked relief, while pressure superficially applied increases the distress. The faradic current is here infinitely superior to the galvanic. In the treatment of the pain of herpes zoster, galvanism is invaluable. In many cases that have fallen under my observation, I have never known it to fail to afford either complete or approximate relief. The effects of galvanism on the extreme suffering that so often accompanies mammary cancer are often little short of magical. I have in many instances seen the acutest agony relieved instantly, and, while this relief is necessarily seldom if ever permanent, it is possible in many cases, by repeated applications, to keep the pain in abeyance for months, and thus

the necessity of constantly administering opium is in a measure obviated. For the relief of neither of the last-named diseases have I found faradization to be of essential service.

As we advance to the consideration of those other forms of disease which experience has shown to be more or less amenable to electrical treatment, it will be found to be more difficult, without submitting the patient to preliminary and tentative applications, to discriminate between the currents best adapted to the case in hand, but I venture to assert that in cases of chorea, of amenorrhœa associated with anæmia and debility, and in cases of nervous exhaustion in general, we cannot often err if we resort to the faradic current by the method of general faradization, either independently or as an adjunct to other treatment.

I once heard a very worthy preacher say that a life-long unbeliever, who happened casually to attend his ministrations, heard him allude briefly but earnestly to the central idea and foundation principle of the faith to which he held and which he advocated. The man was persuaded, and ever after, on all suitable occasions—be the theme of his discourse what it might—the preacher never failed, either directly or incidentally to refer to this central thought, in the hope of impressing its truth on others.

In like manner, I beg to be allowed to allude briefly to this subject of general faradization as a constitutional tonic, not only because I believe it to be the central idea of electrotherapeutics, and to have a wider range of usefulness than any other one method of application, but because without such allusion the treatment of my subject would be very incomplete. It is now nearly ten years since the power of electricity as a tonic was first advanced, and supported by theoretical considerations and clinical illustrations.

Because, perhaps, of its novelty alone, this theory excited at first not a little attention both at home and abroad, but was subsequently quite neglected, so far as concerns any adequate allusion to it, by those who have prominently written and lectured. The evidences, however, of carefully elaborated individual experiences have greatly multiplied during the past decade, and furnished abundant proof of the correctness of

this theory, but unfortunately very few have undertaken to write upon the subject, and these individual experiences, so rich in results and so important as evidences, are practically lost.

Electricity, more than any other therapeutic means, draws to it the folly, ignorance, and cupidity of the land, but all of success that has been achieved by these charlatans has been by some stereotyped application of this method, ignorantly directed; of the evil that has followed the efforts of these "blind leaders of the blind," no man knoweth. I would, therefore, most earnestly urge those who are especially interested in this department to carefully study the *modus operandi*—the *rationale* and effects of general faradization, with the full assurance that a practical and patient application of the principles involved will not only amply reward all expenditure of time and labor, but will be instrumental in at least narrowing the field where greed and ignorance prey upon the suffering and credulity of mankind.

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